

Upper Mississippi River Nine-Foot Channel Project,
Lock and Dam Number 10
Guttenberg, Iowa
Clayton County, Iowa
Grant County, Wisconsin

HAER No. IA-22

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
Rocky Mountain Regional Office
P.O. Box 25287
Denver, Colorado 80225

HISTORIC AMERICAN ENGINEERING RECORD

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Location: 16 miles below the mouth of the Wisconsin River and 615.1 miles above Cairo, Illinois, in Guttenberg, Iowa, Grant County, Wisconsin, and Clayton County, Iowa.

Originally scheduled for construction in Cassville, Wisconsin, the location was changed to Guttenberg, Iowa, due to flooding and related problems. The river valley at the time of construction was approximately two miles wide and alluvial in nature with a riverbed level at about 590 feet above sea level. The town of Guttenberg is sited on a low ridge, the rest of the riverbank areas being overgrown with brush. The movable dam crosses Island 189 in its construction configuration.

Dates of Erection: 1934-1937

Architect/Engineer: U. S. Army Corps of Engineers

Present Owner: United States Government
U. S. Army Corps of Engineers
St. Paul District

Present Use: River navigation and hydrology control

Significance: The Upper Mississippi River Lock and Dam Project represents one of the largest and most ambitious of such undertakings. With roots in the Progressive Era, the project was adopted by New Deal proponents to serve the needs of public employment during the Great Depression. Its successful completion turned the upper reaches of one of the world's largest rivers into a intra-continental canal and settled the questions of a fully navigable interior river system through the Midwest.

Completion of the system helped allay economic inequities in commercial rail and water freight rates brought about as a result of the opening of the Panama Canal. Although significantly altering the environment of the upper Mississippi, the project also served as an impetus for the upgrading of municipal drinking water and sewage disposal systems, as well as

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providing new recreational opportunities, thus, in the end, proving beneficial to public welfare.

Historian: William Patrick O'Brien
October 1987

For complete history, footnotes and bibliography, see HAER No. MN-20.

INDIVIDUAL SIGNIFICANCE AND INVENTORIES -- LOCKS AND DAMS 3 THROUGH 10

The following outlines document specific significant technologies reflected in the construction of the individual lock and dam complexes, calling attention to unique engineering design items. Changes made to various systems since their initial completion are also a part of this section. A number of maintenance changes have occurred at various times since their completion. Changes made before 1970 are not well documented; many were superficial. Complete documentation to system changes is contained in the monthly condition reports filed with the St. Paul District Office by the various installations. Some changes may have been made over the years without benefit of documentation. Therefore, the following tables should not be interpreted as entirely inclusive.

It should be noted that architectural and engineering components vary significantly from site to site. Architectural styles for gate pier design fall into two categories: those completed prior to 1935-1936 (1a, 1b) and those completed after those dates (2a 2b). Only one 1a structure exists in the entire Nine-Foot Channel system and is located at Rock Island, Illinois. As such, it is not a part of this study. The 1b structures are characterized by large, multipane windows, hip roofs, and engaged buttresses detailing on the gatehouse piers. The 2a structures are more streamlined in style with slit, three-pane windows, flat roofs, and no buttress detail. The 2b structures are identical to 2a elements except for addition of a metal panel in the Roller gate track section of the gate piers that does not occur in 2a structures. Only 1b and 2a architectural types occur in the St. Paul District. Other elements, such as central control stations, lockkeepers' residences, and associated structures, are standardized, unless otherwise noted.

Dates for the construction of each complex are given from the beginning of initial work to the end of the project and do not necessarily reflect the construction dates of any single element. Complete construction histories for each complex containing exhaustive documentation for the building of the lock, dam, esplanade features, and other attendant installations are on file with the St. Paul District Office. These histories contain comprehensive listings for all general contractors and subcontractors involved in the project as well

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as a listing for all material suppliers. For the purposes of this study, information regarding contractors and subcontractors has been reproduced as it appears in the construction histories. As a result, certain inconsistencies appear as a matter of course. For example, in some histories the contractor's business location is cited by city; in others, this information is not included. In addition, approximately 10,000 separate construction drawings and illustrations were produced during this project and during the course of maintenance since its completion. Drawings were selected from among these materials to illustrate both standardized elements as well as those pertaining to specific sites. Drawing numbers are noted at the end of entries, where applicable. "()" indicates standardized elements illustrated elsewhere in the system. "*" indicates elements for which drawings are not readily available. General index sheets have also been reproduced at the beginning of each lock and dam illustration collection for a complete reference. Contemporary photographic documentation, including 16mm film footage, served to document the project. Photographs are on file in the St. Paul District Office and at each individual installation. Sixteen millimeter film footage is available in video cassette format from the St. Paul Office.

Dimensions for the movable gate sections are given in approximate figures based on the general notations as found in official Corps publications. For example, Roller gates are generally cited as being standardized as either 60 by 20 feet or 80 by 20 feet. However, in the construction history notations, gate lengths are often given exactly as 88 feet 10-1/2 inches long and 15 feet in diameter. Similar approximations apply to information concerning Tainter gate elements. Measurements in both instances should be taken only as approximations for use in categorizing the various sizes and styles of installations and not as an exact measure per se.

PART I. HISTORICAL INFORMATION

A. Physical History:

1. Dates of Erection: 1934-1937
2. Architect/Engineer: U. S. Army Corps of Engineers
3. Original and Subsequent Owners: United States Government
4. Builders, Contractors, Suppliers:
 - a. General contractor--lock construction:
Hanlon and Oakes, St. Paul, Minnesota

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b. Subcontractors--lock construction:

Ed Wagner, Guttenberg, Iowa (building of general contractor's offices)
Fulton and Fulton, St. Paul, Minnesota (building of steel sheet cofferdam)
Wapello Construction Company, Wapello, Iowa (filling of cofferdam)
P. Freistedt Company, Chicago, Illinois (placing of all embedded metal)
McClintic-Marshall Corp., Chicago, Illinois (furnishing and erection of Tainter valves, Miter gates, and various other metal assemblies)
Commonwealth Electric Company, St. Paul, Minnesota (furnishing and placing of conduit)
W. S. Knott, Minneapolis, Minnesota (furnishing and placement of asbestos tile roof and copper gutter on central control station)
Drake Marble Company, St. Paul, Minnesota (furnishing and placing of tile floor in central control station)
H. Knudson, Chicago, Illinois (painting of wall armor, protection angle, and interior of central control station)

c. General contractor--dam construction:

McCarthy Improvement Company, Davenport, Iowa

d. Subcontractors--dam construction:

R. C. Mahon Company, Detroit, Michigan (furnishing, erecting, and painting dam gates, service bridge, and related items)
E. A. Whitney and Sons, Inc., Kansas City, Missouri (driving of round timber piles)
W. T. Price Dredging Corp., Alton, Illinois (dredging)
Hallett Construction Company, Crosby, Minnesota (placing of all protection stone)
Holmquist and Company, Moline, Illinois (roofing operating housing)

35. Original Plan and Construction: U. S. Army Corps of Engineers

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6. Alterations and Additions:

<u>Item</u>	<u>Year</u>
Tainter gate painting	1945
Riverwall riprap	1946
Upper approach channel dredging	1950
Repaint structural steel	1956
Cathodic protection	1956
Paint gate and stairway	1958
Miter gate reconditioning	1958
Cathodic protection	1962
Concrete flooring	1963
Aluminum grating	1965
Repair access road and esplanade	1966
Machinery rehabilitation	1967
Miter gate repair	1968
Replace chimney	1968
Strobe light assembly	1968
Seal coat access road	1968
Treat timbers	1969
Central control station reroofing	1969
Electrical service	1972
Mooring bit modification	1973
Maintenance service	1973
Scour repair--lock	1980
Upper guidewall repair	1981
Scour repair--dam	1983
Scour repair--spillway	1984

B. Historical Context:

The priority of Lock and Dam 10 and its completion in relationship to other Nine-Foot Channel projects is presently unknown. Originally scheduled for the Cassville, Wisconsin, area, the site was moved to the Guttenberg, Iowa, location because of flooding problems. Built under the supervision and direction of the Rock Island District, the complex was transferred to the St. Paul District's jurisdiction on October 1, 1939.

The system consists of a standard lock, 110 by 600 feet; a planned auxiliary lock, 110 by 360 feet; and a movable dam system composed of both Roller and Tainter gates.

The dam elements consist of a movable dam section, a dike embankment, and a fixed ogee spillway. The movable dam section is of note. Four 80- by 20-foot non-submersible Roller gates are located in the center portion of the dam, flanked by eight Tainter gates, 40 by 20 feet. Two Tainter gates are located

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at the west end of the dam, the other six being located at the east end of the structure. Six of the Tainter gates are non-submersible. The Tainter gates on each end of the movable dam are submersible for three feet and were innovative at the time of their design and construction. The submersible Tainter gates allow spillage from the pool and help stop excessive accumulations of debris. All movable gates are equipped with independent operating machinery.

The 4,597-foot-long earth dike element is located between the dam and the ogee spillway, which is 1,200 feet in length. Esplanade work, a garage, and lockkeepers' dwellings were also part of the complex. Foundation materials consist of piles in sand for both lock and dam system.

Lock lift is 8 feet. Depth on upper Miter sill is 15 feet; lower Miter sill is 12 feet.

The dam was complete as of August 18, 1936, and accepted December 15, 1936. The lock system was completed on March 26, 1935, and opened on May 29, 1935. The complex took three years to complete (1934-1937) at an estimated cost of \$6,647,000. The complex was opened to navigation in 1936.

Responsibility for the design and construction supervision of this complex was accomplished by the U. S. Army Corps of Engineers, Rock Island District.

PART II. TECHNOLOGICAL INFORMATION--LOCK

A. General Statement:

1. Architectural character: standardized Ohio-Mississippi lock design. Drawing number 10-20-1.
2. Condition of fabric: good.

B. Description of General Layout and Principal Elements:

1. Overall dimensions: 110 feet by 600 feet. Drawing number 10-20-1.
2. Foundations: wood and steel sheet pilings in sand.*
3. Walls: reinforced monolithic concrete.*
4. Structural system: see above.
5. Bulkheads: concrete bulkhead configurations occur at each end of the riverward lockwall.*

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6. Upper and lower guidewalls: monolithic reinforced concrete walls extending out from the lock chamber at either end to assist in the guiding of barge traffic into the lock. Drawing numbers 10-20-1 and 10-20-6 (43).
7. Stage recorder: stage recorder installations, as designed in the Rock Island District, did not use the concrete housing configuration common in the St. Paul District. The recorder is located on the landward side, upriver from the esplanade area, and consists of a small metal box-like configuration supplemented by various equipment located on the inside of the central control station.

C. Mechanical Equipment:

1. Operating house: controls for lock gates and Tainter valves housed in small buildings on lockwall. Drawing number 10-41-1.
2. Tainter valves: cable drive lock valve of steel construction with electric motorized assembly. Drawing number 10-25-1.
3. Gates: two Miter gates balanced on stainless steel pintels operated by gear arm system and electric motor assemblies. Bumper lines on interior of lock also of stainless steel. All other associated metal parts are of steel, stainless steel, or steel/nickel alloy. Drawing numbers 10-20-26, 10-21-1, 10-20-17, and 10-22-1.
4. Lighting: various freestanding single and double head lighting standards, ca. 1935.
5. Plumbing: lock is watered by four cable-drive Tainter valves serving a system of cast-in-place tunnels that enable the water level to be controlled on the interior of the lock. Drawing number 10-20-1.
6. Winch: motorized assembly to assist towing of barges through lockage.

D. Other Elements:

1. Auxiliary lock: fixed Miter gate without machinery and partial walls located to the riverward side of the lock complex. Equipped with wells for machinery placement. Never completed or put into service.*

PART III. TECHNOLOGICAL INFORMATION--MOVABLE DAM

A. General Statement:

1. Architectural character: type 2a Roller gate piers have large beveled corners and are elephantine in nature. Drawing number 10-40-1.
2. Condition of fabric: excellent.

B. Description of Exterior:

1. Overall dimensions: 763 feet in length. Drawing number 10-40-1.
2. Foundations: wood and steel sheet pilings in sand.*
3. Operating house walls: monolithic reinforced concrete. Drawing numbers 10-41-1 and 10-41-2.
4. Structural system: monolithic concrete/structural steel.*
5. Bulkheads: concrete bulkheads located at the base of each Roller gate pier. Drawing numbers 10-58-1 and 10-58-2.
6. Operating house openings: two doorways and 13 three-pane slit windows for each Roller gate operating house. Drawing number 10-40-1.
 - a. Doorways and doors: 10"
 - b. Windows: 65*
7. Operating house roofs:
 - a. Shape, covering: flat roof covered in membrane/tar composition.*
 - b. Towers, piers: five Roller gate piers and operating house towers; one access tower. Drawing numbers 10-40-B, 10-40-C, 1; 10-41-1.
8. Access bridges:
 - a. Shape: arched spans in a segmental series.
 - b. Materials: structural steel. Drawing number 10-53-1.

C. Description of General Layout and Principal Elements:

1. Access plans: plan of access consists of a simple stairway to the initial pier operating house, with each installation being connected by an access bridge/rail track in a linear series. Drawing number 10-40-1.
2. Stairways: reinforced concrete with pipe railing.*
3. Flooring: reinforced concrete.*

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4. Wall and ceiling finish: reinforced concrete.*
5. Hardware: brass.*

D. Mechanical Equipment:

1. Movable gates--Roller type: four non-submersible Roller gates, 80 by 20 feet, operating on tooth track and independent chain-driven hoist machinery. Drawing numbers 10-47-1, 10-47-2, 10-47-4, 10-47-20, 10-48-0, 10-48-1, 10-48-2, 10-48-3, 10-48-4, and 10-48-5.
2. Movable gates--Tainter type: two three-foot submersible and six non-submersible Tainter gates having independent chain-driven hoist machinery. Drawing numbers 10-54-0, 10-54-1, 10-54-2, 10-54-3, and 10-54-7.
3. Lighting: fixtures as of time of installations, ca. 1935. Rewiring may have taken place over the years--extent is unknown.*

E. Other Elements:

1. Earth dikes: a linear non-submersible dike with riprap revetment, 4,547 feet in length, runs east/northeast of the movable dam section to the Wisconsin side, incorporating Island 189 into its design. The earth dike is interrupted by an ogee spillway. Drawing number 10-10-17.
2. Spillways: a 1,200-foot reinforced concrete spillway section interrupts the earth dike section at the far east end. Drawing number 10-40-28.
3. Roller/Tainter gate bulkheads: temporary blocking units of structural steel girder construction placed in gate openings in period of emergency or repair. Drawing number 10-58-4.
4. Bulkhead car/tracks: car designed to store and access bulkheads. Located in storage yard.*
5. Flatcar assembly: car for the transport of gate bulkheads and repair materials.*
6. Movable crane: vertical lift crane (replaced ca. 1980) used for the moving of parts and equipment. Operates on track system attached to girder spans. Unit type unknown. Drawings of replacement unit available from St. Paul District Office. Drawing number 10-57-1.

7. Storage yard: area surrounding the last Tainter gate pier on the Minnesota side. Contains replacement parts for gates, bulkheads on track cars, and related repair items.*
8. Boat launch: single-armed launch of metal construction. Installed ca. 1985.*

PART IV. TECHNOLOGICAL INFORMATION--ESPLANADE AREA

A. Description of Esplanade--General Layout:

1. Design character: standardized park/service area component. The esplanade area was originally designed to accommodate the central control station, lockkeeper's and assistant lockkeeper's residences, parking, and other service-related functions. Drawing numbers 10-38-1 and 10-38-20.
2. Historic landscape design: based on standardized designs. See drawings for esplanade and lockkeepers' residences. Drawing number 10-38-3.

B. Condition of Site and Structures: Altered.

1. Central control station--exterior: standardized construction. Hip roof, concrete stucco finish. Drawing numbers: 10-70-1, 10-70-2, 10-70-5, (6, 7, 8).
 - a. First floor contains central control panel and room, bathroom, main office, and basement stairway access. Drawing numbers 10-29-1, 10-29-31, 10-70-2, 10-70-5, and 10-71-1.
 - b. Basement contains storage and equipment rooms. All interior finishes altered from original construction. Drawing number 10-70-2.
2. Lockkeeper's/assistant lockkeeper's residences: standardized Colonial Revival with side porch. The lockkeeper's residence is located on-site and represents the only structure of its type in situ in original Nine-Foot Channel Project area from St. Paul to St. Louis. The assistant lockkeeper's residence has been moved to a site just outside of Guttenberg, Iowa. The garage serving the two structures is also in its original setting, next to the lockkeeper's residence. Drawing numbers 10-74-1, 10-74-1A1, 10-74-2, 10-74-2A1, 10-74-3, 10-76-1, (1A1), 10-76-1, 10-76-2, and 10-76-11.

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3. Outbuildings: various sheds and service buildings have been erected from time to time as demands required. None have particular significance or contribute to the site. The original garage is still on its original site. A new brick garage was built on the site of the assistant lockkeeper's residence, ca. 1985. Drawing numbers 10-76-1 and 10-76-1A1.

C. Other Elements:

1. Gasoline pump: drawings exist for the original gas service pumps installed at the site at the time of its completion. Drawing number 10-37-10.1.

PART V. SOURCES OF INFORMATION

- A. Original Architectural Drawings: St. Paul District Office, Construction Drawings--Nine-Foot Channel Project 1927-1984. Passim.
- B. Early Views: Construction Photographs: Lock and Dam 10--Photograph Log Books.
- C. Interviews: Personnel, Lock and Dam 10
- D. Bibliography:
 1. Primary and unpublished sources: National Archives, Record Group 77; Construction Histories--Lock and Dam 10, see bibliography, HAER No. MN-20.
 2. Secondary and published sources: see bibliography, HAER No. MN-20.
- E. Likely Sources Not Yet Investigated: National Archives, Record Group 77, Suitland, Maryland; St. Louis, Missouri.
- F. Supplemental Material: Aerial Photographs, U. S. Army Corps of Engineers, St. Paul District.